

In The Claims:

1. (withdrawn) An improved bell atomizer for use in electrostatic applications having a bell housing and an aluminum bell cup, the improvement comprising:

a coating formed on a surface of the aluminum bell cup.

2. (withdrawn) The bell atomizer according to claim 1, wherein said coating comprises a wear resistant coating.

3. (withdrawn) The bell atomizer according to claim 2, wherein said wear resistant coating comprises a silicon-doped amorphous carbon coating.

4. (withdrawn) An improved bell atomizer for use in electrostatic applications having a bell housing and a titanium bell cup, the improvement comprising:

an adhesion promoter applied to a surface of the titanium bell cup; and
a coating formed on said adhesion promoter.

5. (withdrawn) The bell atomizer of claim 4, wherein said adhesion promoter comprises a layer of sputtered chrome.

6. (withdrawn) The bell atomizer according to claim 4, wherein said coating comprises a wear resistant coating.

7. (withdrawn) The bell atomizer according to claim 6, wherein said wear resistant coating comprises a silicon-doped amorphous carbon coating.

8. (original) A method for improving wear resistance of the outer surface of an aluminum bell cup, the method comprising the steps of:

preparing the outer surface of the aluminum bell cup;
applying a wear resistant coating to said outer surface.

9. (original) The method according to claim 8, wherein the step of preparing the outer surface of the aluminum bell cup comprises the steps of:

- cleaning said outer surface;
- etching said outer surface;
- rinsing said outer surface;
- drying said outer surface; and
- atomically cleaning said outer surface.

10. (original) The method according to claim 9, wherein the step of cleaning said outer surface comprises the steps of:

- cleaning said outer surface with a soap solution;
- cleaning said outer surface with water; and
- cleaning said outer surface with solvent.

11. (original) The method according to claim 9, wherein the step of etching said outer surface comprises the steps of:

- etching said outer surface with a 5% solution of sodium hydroxide for a predetermined time;
- rinsing said outer surface with water; and
- etching said outer surface with a 1% nitric acid solution for a second predetermined time under ultrasonic agitation.

12. (original) The method according to claim 9, wherein the step of drying said outer surface comprises the step of:

- blow drying said outer surface with air; and
- placing the aluminum bell cup in a vacuum pressure chamber for a predetermined time at a predetermined pressure.

13. (original) The method according to claim 9, wherein the step of atomically cleaning said outer surface comprises the steps of:

atomically cleaning said outer surface by argon bombardment at 200 volts;

atomically cleaning said outer surface by argon bombardment at 500 volts;

and

atomically cleaning said outer surface by argon bombardment at 200 volts.

14. (original) The method according to claim 8, wherein the step of applying a wear resistant coating to said outer surface comprises the steps of:

placing the aluminum bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons;

applying a predetermined frequency and voltage bias from said power source for a predetermined time to coat the aluminum bell cup to a predetermined film thickness at a predetermined silicon composition.

15. (original) The method according to claim 14, wherein the step of placing the aluminum bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the aluminum bell cup in a chamber containing a power source and a gaseous mixture of methane and tetramethylsilane.

16. (currently amended) A method for improving wear resistance of the outer surface of a titanium bell cup, the method comprising the steps of:

preparing the outer surface of the titanium bell cup; and

applying ~~an~~ a chrome adhesion promoter coating to the outer surface;

applying a wear resistant coating to the said chrome adhesion promoter coating.

17. (original) The method according to claim 16, wherein the step of preparing said outer surface of the titanium bell cup comprises the steps of:

- cleaning said outer surface;
- etching said outer surface;
- rinsing said outer surface;
- drying said outer surface; and
- atomically cleaning said outer surface.

18. (original) The method according to claim 17, wherein the step of cleaning said outer surface comprises the steps of:

- cleaning said outer surface with a soap solution;
- cleaning said outer surface with water; and
- cleaning said outer surface with solvent.

19. (original) The method according to claim 17, wherein the step of etching said outer surface comprises the steps of:

- etching said outer surface for a predetermined time in a 3% nitric acid in ethanol solution under ultrasonic agitation;
- rinsing said outer surface with water; and
- immersing the titanium bell cup in ethanol for a second predetermined time under agitation.

20. (original) The method according to claim 17, wherein the step of drying said outer surface comprises the step of:

- blow drying said outer surface with air; and
- placing the titanium bell cup in a vacuum pressure chamber for a predetermined time at a predetermined pressure.

21. (original) The method according to claim 17, wherein the step of atomically cleaning said outer surface comprises the steps of:

atomically cleaning said outer surface by argon bombardment at 200 volts;
atomically cleaning said outer surface by argon bombardment at 500 volts;
and
atomically cleaning said outer surface by argon bombardment at 200 volts.

22. (currently amended) The method according to claim 16, wherein the step of applying ~~an~~ a chrome adhesion promoter coating to said outer surface comprises the step of sputtering a layer of chrome on said outer surface to a predetermined thickness.

23. (currently amended) The method according to claim 16, wherein the step of applying a wear resistant coating to said chrome adhesion promoter comprises the steps of:

placing the titanium bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons;

applying a predetermined frequency and voltage bias from said power source for a predetermined time to coat the titanium bell cup to a predetermined film thickness at a predetermined silicon composition.

24. (original) The method according to claim 23, wherein the step of placing the titanium bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the titanium bell cup in a chamber containing a power source and a gaseous mixture of methane and tetramethylsilane.

25. (previously presented) A method for improving wear resistance of the outer spraying surface of spray application equipment, the method comprising the steps of:

preparing the outer spraying surface of the spray application equipment;
applying a wear resistant coating to said outer spraying surface.

26. (previously presented) The method according to claim 25, wherein the step of preparing the outer spraying surface of the spray application equipment comprises the steps of:

- cleaning said outer spraying surface;
- etching said outer spraying surface;
- rinsing said outer spraying surface;
- drying said outer spraying surface; and
- atomically cleaning said outer spraying surface.

27. (previously presented) The method according to claim 26, wherein the step of cleaning said outer spraying surface comprises the steps of:

- cleaning said outer spraying surface with a soap solution;
- cleaning said outer spraying surface with water; and
- cleaning said outer spraying surface with solvent.

28. (previously presented) The method according to claim 26, wherein the step of etching said outer spraying surface comprises the steps of:

- etching said outer spraying surface with a 5% solution of sodium hydroxide for a predetermined time;
- rinsing said outer spraying surface with water; and
- etching said outer spraying surface with a 1% nitric acid solution for a second predetermined time under ultrasonic agitation.

29. (previously presented) The method according to claim 26, wherein the step of drying said outer spraying surface comprises the step of:

- blow drying said outer spraying surface with air; and
- placing the spray application equipment in a vacuum pressure chamber for a predetermined time at a predetermined pressure.

30. (previously presented) The method according to claim 26, wherein the step of atomically cleaning said outer spraying surface comprises the steps of:

atomically cleaning said outer spraying surface by argon bombardment at 200 volts;

atomically cleaning said outer spraying surface by argon bombardment at 500 volts; and

atomically cleaning said outer spraying surface by argon bombardment at 200 volts.

31. (previously presented) The method according to claim 25, wherein the step of applying a wear resistant coating to said outer spraying surface comprises the steps of:

placing the spray application equipment in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons;

applying a predetermined frequency and voltage bias from said power source for a predetermined time to coat the spray application equipment to a predetermined film thickness at a predetermined silicon composition.

32. (previously presented) The method according to claim 31, wherein the step of placing the spray application equipment in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the spray application equipment in a chamber containing a power source and a gaseous mixture of methane and tetramethylsilane.

33. (previously presented) The method of claim 25 further comprising the step of applying an adhesion promoter to said outer spraying surface of the spray application equipment prior to the step of applying a wear resistant coating to said outer spraying surface.

34. (previously presented) The method according to claim 25, wherein the step of applying an adhesion promoter coating to said outer spraying surface comprises the step of sputtering a layer of chrome on said outer spraying surface to a predetermined thickness.

35. (previously presented) The method of claim 8, wherein applying a wear resistant coating to said outer surface comprises applying a wear resistant carbon coating to said outer surface.

36. (previously presented) The method of claim 35, wherein applying a wear resistant coating to said outer surface comprises applying a silicon-doped amorphous carbon coating to said outer surface.

37. (previously presented) The method of claim 16, wherein applying a wear resistant coating to the adhesion promoter coating comprises applying a wear resistant carbon coating to the adhesion promoter coating.

38. (previously presented) The method of claim 37, wherein applying a wear resistant carbon coating to the adhesion promoter comprises applying a silicon-doped amorphous carbon coating to the adhesion promoter coating.

39. (previously presented) The method of claim 25, wherein applying a wear resistant coating to said outer spraying surface comprises applying a wear resistant carbon coating to said outer spraying surface.

40. (previously presented) The method of claim 39, wherein applying a wear resistant carbon coating to said outer spraying surface comprises applying a silicon-doped amorphous carbon coating to said outer spraying surface.

41. (New) The method of claim 35, wherein applying a wear resistant coating to said outer surface comprises applying a tungsten-doped amorphous carbon coating to said outer surface.

42. (New) The method of claim 35, wherein applying a wear resistant coating to said outer surface comprises applying a titanium-doped amorphous carbon coating to said outer surface.

43. (New) The method according to claim 14, wherein the step of placing the aluminum bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the aluminum bell cup in a chamber containing a power source and a gaseous mixture of methane and diethylsilane.

44. (New) The method according to claim 14, wherein the step of placing the aluminum bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the aluminum bell cup in a chamber containing a power source and a gaseous mixture of a first hydrocarbon and tetramethylsilane, said first hydrocarbon selected from the group consisting of acetylene, ethene, butane, pentyne, and benzene.

45. (New) The method according to claim 14, wherein the step of placing the aluminum bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the aluminum bell cup in a chamber containing a power source and a gaseous mixture of a first hydrocarbon and diethylsilane, said first hydrocarbon selected from the group consisting of acetylene, ethene, butane, pentyne, and benzene.

46. (New) The method of claim 16, wherein applying a wear resistant coating to said outer surface of the adhesion promoter comprises applying a tungsten-doped amorphous carbon coating to said outer surface of the adhesion promoter.

47. (New) The method of claim 16, wherein applying a wear resistant coating to said outer surface of the adhesion promoter comprises applying a titanium-doped amorphous carbon coating to said outer surface of the adhesion promoter.

48. (New) The method according to claim 23, wherein the step of placing the titanium bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the titanium bell cup in a chamber containing a power source and a gaseous mixture of methane and diethylsilane.

49. (New) The method according to claim 23, wherein the step of placing the titanium bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the titanium bell cup in a chamber containing a power source and a gaseous mixture of a first hydrocarbon and tetramethylsilane, said first hydrocarbon selected from the group consisting of acetylene, ethene, butane, pentyne, and benzene.

50. (New) The method according to claim 23, wherein the step of placing the titanium bell cup in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the titanium bell cup in a chamber containing a power source and a gaseous mixture of a first hydrocarbon and diethylsilane, said first hydrocarbon selected from the group consisting of acetylene, ethene, butane, pentyne, and benzene.

51. (New) The method of claim 27, wherein applying a wear resistant coating to said outer surface of the spraying equipment comprises applying a tungsten-doped amorphous carbon coating to said outer surface of the spraying equipment.

52. (New) The method of claim 27, wherein applying a wear resistant coating to said outer surface of the spraying equipment comprises applying a titanium-doped amorphous carbon coating to said outer surface of the spraying equipment.

53. (New) The method according to claim 31, wherein the step of placing the spray application equipment in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the spray application equipment in a chamber containing a power source and a gaseous mixture of methane and diethylsilane.

54. (New) The method according to claim 31, wherein the step of placing the spray application equipment in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the spray application equipment in a chamber containing a power source and a gaseous mixture of a first hydrocarbon and tetramethylsilane, said first hydrocarbon selected from the group consisting of acetylene, ethene, butane, pentyne, and benzene.

55. (New) The method according to claim 31, wherein the step of placing the spray application equipment in a chamber containing a power source and a gaseous mixture of hydrocarbons and silicon-doped hydrocarbons comprises the step of:

placing the spray application equipment in a chamber containing a power source and a gaseous mixture of a first hydrocarbon and diethylsilane, said first hydrocarbon selected from the group consisting of acetylene, ethene, butane, pentyne, and benzene.